



## Full length article

## Adolescents' smoking environment under weak tobacco control: A mixed methods study for Portugal



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## ABSTRACT

**Introduction:** Bans on smoking in public places and on sales to minors have been widely implemented across the globe. However, many countries have either adopted non-comprehensive (i.e., partial) bans and/or weakly enforce those bans. Little is known, from the adolescents' perspective, how this affects their smoking-related perceptions and behaviors. We studied the case of Portugal, where bans are partial and/or weakly enforced. We sought to understand how the bans affect adolescents' access to cigarettes from commercial sources, the visibility of smoking in public places, and smoking locations.

**Material and methods:** We used a mixed methods design on data gathered in 2016. Quantitative, cross-sectional surveys were conducted in six schools (n = 2,444) in Coimbra, Portugal. In two of these schools, qualitative data were collected in eight single-sex focus group interviews (n = 42).

**Results:** Ninety-five percent of the adolescents who tried to buy cigarettes were able to do so from commercial sources, through vending machines, or directly from the vendor. Bans on smoking on school premises and at enclosed public places did not prevent these adolescents from observing smoking outside school gates (84.0%), in cafes and restaurants (97%), or from smoking at cafes, bars, or nightclubs (72.9%).

**Discussion:** Partial and/or weakly enforced policies seem to not prevent adolescents from having access to cigarettes, frequently seeing smoking, and finding ample opportunities to smoke in public places. Adopting and enforcing comprehensive policies are necessary efforts to prevent unfavorable responses and more effectively reduce adolescents' smoking behavior.

## 1. Introduction

Preventing smoking among adolescents is of special interest, as smoking is usually initiated during this phase of life (Russo et al., 2011) and about two thirds of young smokers will continue to smoke in adulthood (U.S. Department of Health and Human Services, 2012). Tobacco control policies (TCP) have been widely implemented in the last decades in order to reduce smoking prevalence (World Health Organization, 2017a). Tobacco age-of-sale laws specifically seek to reduce adolescents' access to tobacco products, and bans on smoking in public places seek to limit exposure to smoking and their opportunities

to smoke (Joossens and Raw, 2016; National Cancer Institute and World Health Organization, 2016; National Institute for Health and Care Excellence, 2008; World Health Organization, 2017a).

The adoption of comprehensive TCPs has been included by the World Health Organization in the Framework Convention On Tobacco Control (WHO-FCTC) (World Health Organization, 2017a). However, most European countries have adopted only partial smoking bans (World Health Organization, 2018, 2017a) and smoking in public places is often allowed in assigned smoking areas within enclosed public places, such as cafés, bars, and restaurants, or outside school areas. Moreover, the enforcement of these bans and age-of-sales laws

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tends to be weak in most countries (Joossens and Raw, 2016; World Health Organization, 2017a).

Partial designs and poor enforcement may be undermining the effect of such bans on adolescents' smoking. First, weak enforcement of the ban on sales to minors may allow minors access to tobacco products (Hublet et al., 2009; National Cancer Institute and World Health Organization, 2016). Second, the adoption of partial smoking bans, or their weak enforcement, may maintain the visibility of smoking and increase adolescents' opportunities to smoke (Galanti et al., 2013; National Institute for Health and Care Excellence, 2008; World Health Organization, 2017a). Third, partial and weakly enforced bans may convey ambiguous messages about smoking, maintain the social acceptability of smoking, and downplay its dangers (Galanti et al., 2013; National Cancer Institute and World Health Organization, 2016; National Institute for Health and Care Excellence, 2008).

It is important to assess the effects of these partial and weakly enforced bans from the perspective of adolescents themselves, to understand how they perceive them, and how these influence adolescents' smoking behaviors. This evidence has been gathered together in two recent reviews. Schreuders et al. (2017) assessed the impact of bans on smoking at school premises, and found that these bans may foster anti-smoking social norms and beliefs in adolescents. However, youth can respond to these bans in ways that maintain pro-smoking norms and beliefs (e.g., by banding together in smoker groups). Nuyts et al. (2018) looked at the impact of bans on sales to minors, and found that these may decrease commercial access to cigarettes, but that this impact may be attenuated by access through proxy sales or social networks and circumvention strategies to maintain commercial access.

Both reviews found that most of the empirical evidence comes from qualitative studies carried out in English-speaking countries, with virtually no evidence from non-English speaking European countries, or from countries with non-comprehensive bans and/or weak enforcement. Yet, such evidence is important, given the persistently high youth smoking rates.

In order to contribute to this evidence, we combined quantitative and qualitative data, seeking to understand how these partially designed and/or weakly enforced bans affect adolescents' smoking behaviors. We addressed the adolescents' perspective, and focused on their perceptions about their access to tobacco products, visibility of smoking in public places, and smoking locations. We used the example of Portugal, a context in which TCPs have partial designs and/or are weakly enforced (Joossens and Raw, 2016; World Health Organization, 2017a) and in which the overall smoking prevalence has remained stable since the late 1980s, with a falling trend in males being counterbalanced by a rising trend in females (Leite et al., 2017). In 2008, a smoking ban was implemented which increased the legal minimum age-of-sale of tobacco products from 16 to 18 years old (World Health Organization, 2017b). The smoking ban was partial, as it allowed for the designation of specially assigned smoking areas inside cafés, bars, clubs, and restaurants, and it allowed for smoking around schools, including just outside school gates. Vending machines were required to have locking systems but were not banned. Despite the high public support for the implementation of more comprehensive TCPs (European Commission, 2017, 2015), partial TCPs were still in place at the time of our data collection in 2016 (World Health Organization, 2017a).

## 2. Methods

We performed a cross-sectional mixed methods study, using a sequential explanatory approach. It comprises three phases: one phase of quantitative data analysis followed by a second phase of qualitative data analysis, which helps explain the statistical results obtained from the first phase (Ivankova et al., 2006). These two phases are linked in a third phase by discussing quantitative and qualitative results together. In the first phase, we analyzed quantitative data to obtain an initial picture of the adolescents' perception of access to cigarettes, visibility of

smoking in public places, and smoking locations, including schools and other public places where they gather. In the second phase, we analyzed qualitative data for a deeper understanding of how adolescents access cigarettes, and how they perceive smoking in public places and whether they smoke in these places.

Data were collected from schools in Coimbra, a city with population size, income, and employment rates similar to the national average, within the SILNE-R project (Lorant et al., 2015). Data collection occurred between October and December 2016. The Portuguese Education Ministry granted the ethics approval (Agreement number 0338600002), and all school directors approved data collection.

### 2.1. Quantitative survey

Quantitative data were collected through a survey completed in six schools that agreed to participate, after having invited all 10 secondary schools registered in Coimbra. These six schools were from high and low socioeconomic status (SES) contexts (Lorant et al., 2015). We invited students from the 1st year of the ISCED-3 level (15 years-old mean age) to participate in the survey. Parental opt-out consent was obtained in all schools except one, which required active parental consent. Adolescents were free not to participate. A total of 2,444 adolescents responded to the quantitative survey, which lasted about one school hour (50 min).

A total of 12 variables measured the three main concepts of access to cigarettes, visibility of smoking in public places, and smoking locations. Access to cigarettes was measured by three variables: "How difficult do you think it would be for you to get cigarettes if you wanted?" (responses vary from very difficult to very easy), "During the past 30 days, how did you usually get your own cigarettes?" (adolescents who had ever tried smoking chose one or more options from a list of sources such as shops, vending machines, friends, etc.), "In the last 30 days have you bought or tried to buy cigarettes from a shop, street vendor, vending machine, service station, or on the internet?" (ever triers who tried to buy chose between "bought" and "was refused").

Visibility of smoking at school was measured among the total sample by three variables: "How often do you see teachers smoking on school premises?", "How often do you see students smoking on school premises?", and "How often do you see people smoking just outside your school?" Responses ranged from never, sometimes, often, to always. Visibility of smoking in other public places was measured with the question: "In the last 6 months, have you seen people smoking in any of these places?" with two of the answer categories being "cafes/bars/clubs" and "restaurants". This latter question was asked only to respondents who reported having visited these places. Smokers reported in which public places they regularly smoked. These locations were captured in four dichotomous variables indicating whether adolescents smoked "just outside school gate", "in café, bar, nightclub", "in shopping center", "in other public places (parks, street corners)." Neither the questions on smoking visibility nor smoking locations distinguished between indoor or outdoor spaces of schools, cafés, bars, nightclubs, restaurants, or shopping centers.

We also measured age (in years), sex (male, female), perceived family SES, and smoking status. For the last of these we created three terciles according to the distribution of the whole sample on the Subjective Social Status MacArthur Scale (Goodman et al., 2001): 1–5 responses were grouped as low family SES, 6–7 as medium, and 8–10 as high. Smoking was measured with the question "How many cigarettes have you smoked in the last 30 days?" We grouped never and former-smokers in a "none" category, and smokers into the categories 1–2 cigarettes/month, 1–2 cigarettes/week, 3–7 cigarettes/week, 1–10 cigarettes/day, and > 10 cigarettes/day. Smoking statuses of family and friends were measured with "Does any member of your family smoke cigarettes?" (yes/no/stopped smoking), and "Do any of your best and closest friends smoke cigarettes?" (none, some, most, all of them).

These variables were described for the sample composed of all six

Portuguese schools, and then for the two schools where qualitative data were collected.

## 2.2. Focus groups discussions

We performed eight single-sex focus groups (42 students) in a low and a high SES school of the six schools where SILNE-R quantitative data were collected (Lorant et al., 2015). Both were public schools. The low SES school was mostly vocational and located on the outskirts of the town, while the high SES was mostly non-vocational and located in the city center.

Students who smoked or were at risk of smoking were invited by teachers to participate in the focus group discussions. Opt-out consent was used, and we ensured the anonymity of participants and confidentiality of their answers. Twenty girls and 22 boys participated in the focus groups, and the mean ages ranged from 15 to 17 years. The focus groups had a duration of 26–42 min. The topic guide included questions on smoking norms, attitudes and perceptions, access to cigarettes, school context, and e-cigarettes awareness and use. The discussion was facilitated in all focus groups by the first author, who also reviewed all transcripts and translations of the citations given in this paper.

We followed a deductive-inductive thematic analysis (Braun and Clarke, 2006), identifying all contents that contributed to a better understanding of the quantitative results related to three general themes of the paper: access to cigarettes, visibility of smoking in public places, and smoking locations. Data were uploaded for analysis in MAXQDA Analytics Pro 2018.

## 3. Results

### 3.1. Quantitative data results

Table 1 presents the characteristics of the sample from all six schools, and from the low and high SES schools selected for the focus groups. The sample had a mean age of 15.8 years-old, with a higher mean age (16.2 years) in the low SES school. Smoking prevalence and intensity was higher in the low SES school, e.g., about 11% of smoking students smoked one cigarette or more per day against 9% in the high SES school. Having friends, parents, or siblings who smoked or stopped smoking was also more common in the low SES school.

Table 2 presents the main results regarding adolescents' access to cigarettes, visibility of smoking in public places, and smoking locations. Adolescents who reported having smoked one cigarette or more in the last month usually obtained cigarettes from commercial sources (48.6% from vending machines, and 31.2% from shops), or from peers (52.6%). The large majority of the sample (73.2%) reported that it would be fairly easy or very easy to buy tobacco if they wanted to. Among those who had tried to buy tobacco from commercial sources in the last 30 days, 97.5% were able to do so, and only 2.5% of students were refused.

Eighty-four percent of the total sample reported often seeing or always seeing smoking outside school, 73.7% reported often seeing students smoking in the school area, and 42.2% seeing teachers smoking. Seeing smoking in other public places was also very common, with high rates in bars, cafes, and clubs (97.0%).

No large differences were observed by SES regarding access to cigarettes from commercial sources and visibility of smoking in public places.

Regarding smoking locations, 38.2% of smokers reported usually smoking at the school gate, 72.9% at a café, bar, or nightclub, 13.4% at a shopping center, and 49.5% in other public places, such as streets. A higher proportion of smokers from the high SES school reported smoking at these locations.

**Table 1**  
Sample characteristics: distribution of the sample by sociodemographic characteristics, smoking status, and family and friends smoking.

	All	Low SES school	High SES school
<b>Age (mean <math>\pm</math> SD)</b>	15.8 $\pm$ 1.0	16.24 $\pm$ 1.17	15.54 $\pm$ .91
<b>Sex</b>			
Male	51.2%	60.1%	41.6%
Female	48.8%	39.9%	58.4%
<b>Friends smoke</b>			
None	32.4%	27.6%	32.8%
Some	51.6%	49.1%	47.2%
Most	13.6%	20.6%	15.9%
All	2.4%	2.6%	4.1%
<b>Father smokes</b>			
No	49.1%	40.4%	50.3%
Stopped	19.7%	17.7%	17.3%
Yes	31.2%	41.9%	32.3%
<b>Mother smokes</b>			
No	69.7%	63.5%	69.0%
Stopped	9.8%	10.7%	8.3%
Yes	20.5%	25.9%	22.8%
<b>Siblings smoke</b>			
No	79.2%	71%	83.7%
Stopped	2.0%	0.8%	3.2%
Yes	18.8%	28.2%	13.2%
<b>Family subjective SES</b>			
Low (1–5)	26.8%	40.9%	23.5%
Medium (6–7)	34.7%	30.9%	32.3%
High (8–10)	38.5%	28.2%	44.2%
<b>Smoking intensity and frequency</b>			
Didn't smoke in the last month or never tried	82.5%	77.4%	86.5%
1–2 cigarettes/month	4.4%	4.9%	2.8%
1–2 cigarettes /week	2.2%	2.6%	0.9%
3–7 cigarettes /week	2.5%	4.0%	0.6%
1–10 cigarettes /day	5.5%	4.9%	6.3%
> 10 cigarettes /day	2.9%	6.2%	2.8%
Total sample	n = 2444	n = 269	n = 434

### 3.2. Qualitative data results

#### 3.2.1. Access to cigarettes from commercial sources

Adolescents who smoked or were at risk of smoking reported having very easy access to cigarettes, even “100% easy” (Male). They usually avoided buying cigarettes from places nearby their homes or frequented by parents or acquaintances, as they were afraid that their parents would discover that they smoke. They also avoided shopping centers, as vendors ask for ID cards for age verification, and refuse to sell tobacco to minors. They usually bought cigarettes in cafés, newsstands, and tobacco shops, directly over the counter or using vending machines. Vending machines' age control systems were easily unlocked by asking for an ID card from an older friend, which is not verified by the vendor, or by using the remote control (“it's like ‘gimme the remote’ I open and such” (Female)). Remote controls are provided to vendors so that they can unlock the vending machines after verifying the buyers age. Adolescents reported that vendors rarely ask for the ID card to confirm the buyers' age: “It's very easy [to buy] because they just want to make money. (...) They never did [ask for ID card when buying cigarettes]” (Male).

Adolescents reported that buying cigarettes may be limited if the adolescent looks younger, as compliance relies mostly on their apparent age and less on ID cards: “If you really have a kid's face... believe me they won't sell it to you” (Male). Their older looking peers play an important role in buying cigarettes, as adolescents refrain from asking strangers to do so: “you always have the older friends and... everybody sells... almost... every café and such” (Male).

**Table 2**

Survey results: Perception of access to cigarettes, visibility of smoking in public places, and smoking locations.

	All	Low SES school	High SES school
<b>ACCESS TO CIGARETTES</b>			
<b>Perceived access to cigarettes</b>			
Very difficult	11.3%	11.2%	8.8%
Fairly difficult	15.4%	15.6%	11.6%
Fairly easy	38.4%	43.8%	34.9%
Very easy	34.8%	29.5%	44.7%
Total sample	n = 2444	n = 269	n = 434
<b>Sources of cigarettes</b>			
Shop or service station	31.2%	26.0%	32.6%
Vending machine	48.6%	44.0%	58.1%
Parents/siblings gave	7.5%	8.0%	14.0%
Friends gave	52.6%	58.0%	69.8%
Friends, parents/siblings sold	6.2%	4.0%	14.0%
Asked minor to buy	5.6%	2.0%	6.9%
Asked adult to buy	9.0%	4.0%	11.6%
Asked unknown adult	2.5%	0%	7.0%
Internet	1.2%	0%	7.0%
Subsample smokers	n = 321	n = 50	n = 43
<b>Experienced access to cigarettes</b>			
Was refused	2.5%	6.7%	0.0%
Bought cigarettes	97.5%	93.3%	100%
Subsample smokers who tried to buy	n = 201	n = 30	n = 26
<b>VISIBILITY OF SMOKING IN PUBLIC PLACES</b>			
<b>See smoking outside school</b>			
Never	3.4%	0.9%	1.2%
Sometimes	12.6%	14.5%	8.4%
Often	23.9%	36.4%	20.0%
Always	60.1%	48.2%	70.3%
<b>See students smoking at school</b>			
Never	15.9%	5.8%	7.8%
Sometimes	10.4%	10.7%	8.2%
Often	31.2%	38.8%	26.6%
Always	42.5%	44.6%	57.4%
<b>See teachers smoking at school</b>			
Never	28.4%	17.5%	21.5%
Sometimes	29.5%	30.0%	29.7%
Often	25.8%	33.6%	25.9%
Always	16.3%	18.8%	22.8%
Total sample	n = 2444	n = 269	n = 434
<b>See smoking in restaurants</b>			
Subsample adolescents who go to restaurants	n = 1836	n = 226	n = 313
<b>See smoking bars/cafes/clubs</b>			
Subsample adolescents who go to bars/cafes/clubs	n = 1691	n = 210	n = 280
<b>SMOKING LOCATIONS</b>			
Smoke at school gate	38.32%	40.0%	62.8%
Smoke in cafe, bar, nightclub	72.9%	60.0%	88.4%
Smoke in shopping centers	13.4%	16.0%	23.3%
Smoke in other public places	49.5%	42.1%	62.8%
Subsample smokers (monthly or more)	n = 321	n = 50	n = 43

### 3.2.2. Visibility of smoking in public places

Students do not see teachers smoking inside the school, but they see them smoking in the schools' surrounding areas, sometimes near students, but normally keeping some distance from them. Considering this, teachers' advice to stop smoking was perceived as ironic or incongruent:

"P: We also had Mr. F.: 'hey man, quit smoking' every recess, and he with a cigarette in his mouth. (...) 'He tells me to quit smoking but he's smoking'". [laughter] (Male).

Adolescents discussed the high visibility of smoking at school: "Every break there's people, there's people smoking outside; everybody smokes, pretty much" (Male). Adolescents reported often seeing

smoking in public places: "we go to the café or such, there's always someone smoking a cigarette" (Male). Although smoking was commonly seen in cafés, adolescents rarely reported seeing specially assigned areas to smoke, and when they mentioned them, they commented that they did not guarantee effective smoke extraction or limit smoke circulation to non-smoking areas: "P: Or you have areas for non-smokers and for smokers. P: That is why I get home with such a smell [of tobacco]" (Male).

### 3.2.3. Smoking locations

In contrast to quantitative results, focus group participants unanimously reported that smoking inside school premises was rare. They suspected that non-compliant cases would be sanctioned by the principal, by calling their parents or by suspension, yet they were not sure about what the exact sanctions would be applied. If smoking occurred inside school premises, this happened either in secrecy, or in some rare cases with the staff members' consent in the area inside the school gate. This is the case for some students that do not have parents' authorization to leave school during the school day:

"P: There are people that, for instance, when it's raining, instead of going outside, they stay at the entrance [school gate]... P: (...) because the staff women let them stay right at the entrance, right on the limit [of the school area]" (Male).

"P: ... but even the ones that don't have it [the authorization to leave the school], the doorkeeper [is] like 'Okay, you want to have a smoke? Get out here, right by the door, you stay here, you smoke and you come inside'" (Male).

Smoking was reported to be much more common in the area surrounding the school premises, especially at the gate. Students usually gather during school breaks at the gate to smoke:

"It's that hustle of break time, like, at break time, everybody gathers outside 'look, let's have a smoke.' That is the normal thing. I come to school and I smoke more than if I'm, like, at home all day" (Male).

"[I thought] that I was going to reduce, but after all when I got here everybody smoked and well, usually... in order not to be alone... I would go with them... so I smoke" (Male).

Some participants reported having started smoking in cafés. Despite being more common to smoke on weekdays around schools, students often reported smoking in public places while gathering with their peers:

"R: Where do they usually smoke more?

P: In the street.

P: 5 m away from the school [joking tone] (...).

P: Or at school... or in a café, or in a bar, or in a club" (Male).

"P: (...) when we go out.

(...) P: Eh I mean, me and my friends we hang out every day and we smoke every day anywhere" (Male).

The common message was: "we can [smoke] everywhere." After asking to better identify the places where they or their friends smoked, they specified smoking where they can, especially "where parents won't see." Smoking in cafés, bars, or clubs, and smoking in the street, gardens, or around a shopping center was frequent. The respondents rarely mentioned smoking in specially designed areas in cafes, bars, or clubs. Being underage did not seem to limit these adolescents' entrance to cafes, bars, or clubs, or their smoking in these places.

Focus groups of both high and low SES schools showed similar views on how and where they have access to cigarettes, where they smoke, and how they perceive smoking in public places.

## 4. Discussion

### 4.1. Main findings

The success rate of adolescents who try to buy cigarettes is very high in Coimbra, Portugal. Most of them obtain their cigarettes from commercial sources, such as cafes, where vendors rarely check their age,



and vending machines, which have restriction measures that are easily bypassed. Adolescents rarely buy cigarettes in shopping centers as vendors seem to be more compliant with the ban.

At schools, the visibility of teachers and students smoking was reported to be high. Smoking was rare inside school, and was most commonly seen in the area just outside the school gate (both students and teachers). Students often gathered just outside the school gate during breaks, where it is allowed to smoke. Adolescents also commonly saw smoking in other public places, such as cafés, bars, and clubs.

#### 4.2. Interpretation

First, monthly smoking prevalence reported by our six-schools sample does not differ greatly from that reported in 2015 by the ESPAD Survey (17.5% vs 19%, respectively), and weekly smoking does not differ much from that reported by the HBSC 2013/2014 Survey (11% vs 13.1%). Daily smoking prevalence has decreased in the last three decades among male adolescents (from about 20% to 12%), but increased among female adolescents (from about 5% to 9%) (Leite et al., 2017).

In line with the literature (Deco, 2012; Kraus et al., 2016), Coimbra's adolescents perceived easy access to cigarettes. There are three main explanations for this despite the ban on sales to minors: 1) cigarette vending machines are still available, which are easily unlocked by minors, 2) compliance among vendors is low, as they do not verify the ID card of the buyers, and 3) adolescents are able to circumvent the age-limit by using older friends' ID cards (Nuyts et al., 2018; Schreuders et al., 2017). While adolescents may easily access cigarettes using vending machines as a response to the permissive legislation found in Portugal, the low compliance of vendors, also reported in 2012 (Deco, 2012), seems to be related to the weak enforcement of the ban. These findings are in line with those from Nuyts et al. (2018): inadequate implementation, with access from small outlets and vending machines, reduce the ban's capacity of limiting adolescents' access to tobacco products, while strong enforcement in highly controlled settings could effectively reduce adolescents' smoking behavior. As in other studies (Baillie et al., 2007; Hamilton et al., 2008), our results suggest that partial and weakly enforced bans have limited effect on reducing access to cigarettes and smoking, and even contribute to the feeling of higher autonomy and maturity among those able to buy cigarettes from commercial sources. A review from the National Cancer Institute (2016) noted that bans on sales to minors could have mixed effects depending on the compliance of vendors. In contrast, the implementation of total bans on vending machines in the US was associated with a lower proportion of youth smoking (Vuolo et al., 2016).

Visibility of smoking around school gates was common, as were adolescents' opportunities to smoke at or near schools. Adolescents usually did not smoke inside school premises, as they believed some punishment would be applied, and because smoking is allowed just outside school gates during all school breaks. This suggests that strong implementation of the smoking ban on school premises may effectively reduce smoking and make smoking less acceptable inside school premises. However, as the ban does not define a smoke-free zone around school premises, it does not prevent smoking during school days outside the school gates. Moreover, teachers smoking in sight of students transmits contradictory messages on the consequences of smoking. These results are in line with the hypothesis from Schreuders et al. (2017) that a smoking ban on school premises could fail to affect adolescents' smoking if they easily find alternative places to smoke, such as outside the school gate, or if social opinions and interpretations of smoking remain unchanged.

These findings underscore that more comprehensive and strongly enforced smoking bans would more effectively reduce adolescents' opportunities to smoke in public places, and convey a clearer and more consistent message about the dangers of smoking (National Cancer Institute and World Health Organization, 2016; National Institute for

Health and Care Excellence, 2008; World Health Organization, 2017a). A cross-country analysis of smoking visibility in bars after the implementation of a smoke-free ban showed a reduction in all countries, with a steeper decline in those in which the ban was strongly enforced, communicated by a media campaign, and had considerable political support (National Cancer Institute and World Health Organization, 2016). Bajoga et al. (2011) observed a significant reduction in smoking prevalence in 18 out of 21 countries/states where a comprehensive smoke-free legislation had been implemented. An International Agency for Research on Cancer review concluded that comprehensive smoke-free bans could affect both adults' and adolescents' smoking (World Health Organization International Agency for Research on Cancer (WHOIARC, 2009).

#### 4.3. Limitations

Despite having tested the survey questions and the topic guide, having informed respondents that their answers were confidential, and having restricted teachers' access to survey responses or to the focus groups rooms, we cannot exclude the possible presence of response bias due to social acceptability, recall issues, or to misunderstanding of the survey questions. Misunderstanding of the survey questions was, in fact, observed for the question regarding visibility of smoking at school, as it did not differentiate between the inner or exterior areas. One of the low SES school focus groups included two participants who were aged 18 and 19 years old. These participants were asked to think back to when they were minors, and their responses did not differ from those of the remaining participants.

The generalization of these results to other Portuguese settings and to other countries must be done with caution, as our results were based on findings from a single city. However, our sample includes high and low SES, and public and private schools from a medium-sized city with an average income similar to what prevails in Portugal (Lorant et al., 2015). In Portugal, TCPs are designed at the national level, and implementation and monitoring is defined by a national-level institution. However, geographical variations in compliance may exist. In 2012, only 16 out of a 59 points-of-sale sample were compliant with the ban on sales to minors; Coimbra was one of the cities with higher compliance rates (Deco, 2012). In 2010–2011 only a third of bars/discos fully banned indoor smoking; the Center (Coimbra) region was one of the regions with lower compliance (Reis et al., 2014). These studies demonstrate that despite these variations, non-compliance with bans is not restricted to Coimbra, and the loopholes and causes here identified may be applied to the whole country.

Considering that the implementation of TCPs remains suboptimal in several other countries, both in Europe and elsewhere (Joossens and Raw, 2016; Kraus et al., 2016; Kuipers et al., 2015; World Health Organization, 2017a), our findings may be relevant to the implementation of youth-related bans in these countries. Even though our results cannot be readily generalized, they emphasize the need for comprehensive and well enforced bans combined with monitoring of adolescents' perceptions and responses.

#### 4.4. Implications

In an environment of partial bans and weak enforcement, adolescents' access to cigarettes, visibility of smoking, and opportunities to smoke in public places remain high. Strong enforcement of bans on sales to minors may effectively reduce access to tobacco products from commercial sources, especially when banning vending machines. Comprehensive and well enforced bans on smoking in public places, including bans on smoking around schools during school days, are expected to reduce visibility of smoking and opportunities to smoke in public places. Evaluation of TCPs should not be overlooked, as it is fundamental to identify loopholes in these measures, and improve their effectiveness.

## Contributors

TL and JP conceptualized the study. TL and JP were responsible for study design, data collection, and data analysis. All authors were responsible for interpretation of results. TL wrote the manuscript, and all authors contributed the revision and approval of the manuscript.

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## Declaration of Competing Interest

No conflict declared.

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